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ASSIGNMENT BOOKLET

SCN2231 Biology 20

Module 3 Assignment

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Biology 20

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Module 3 **ECOSYSTEMS AND THEIR DIVERSITY** *ASSIGNMENT BOOKLET*

FOR TEACHER'S USE ONLY

Summary

	Total Possible Marks	Your Mark
Lesson 1 Assignment	37	
Lesson 2 Assignment	24	
Lesson 3 Assignment	12	
Lesson 4 Assignment	36	
Lesson 5 Assignment	29	
Lesson 6 Assignment	116	

Teacher's Comments

Biology 20
Module 3: Ecosystems and Their Diversity
Assignment Booklet
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Teachers ☒

Administrators ☐

Home Instructors ☐

General Public ☐

Other ☐



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- Alberta Education, <http://www.education.gov.ab.ca>
- Learning Resources Centre, <http://www.lrc.education.gov.ab.ca>
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MODULE 3: LESSON 1 ASSIGNMENT

This Module 3: Lesson 1 Assignment is worth 37 marks. The value of each assignment and each question is stated in the left margin.

(37 marks) **Lesson 1 Assignment: Populations, Communities, and Ecosystems**

(20 marks) **TR 4. Wolves, Trees, and Elk**

- a. You have been asked to access the podcast titled “Wolves, Trees, and Elk” or articles describing how the reintroduction of wolves to Yellowstone National Park has helped the aspen tree population recover in certain areas. Based on the information you have heard or read, create an organizational diagram or chart showing the ecological interactions occurring within the Yellowstone National Park ecosystem. Your diagram must be visual and may include drawings, text, or a combination of artwork and words. You may use Paint, Excel, Word, Inspiration, or any other appropriate program to create the diagram. Your diagram should include the following components of the ecosystem:
- the abiotic components and their effects on each population
 - the populations interacting with other populations

- b. How might the removal of one of the biotic or abiotic components affect the ecosystem? Give an example based on the diagram you just created.

For both parts of the TR. 4 question, you will be graded according to the following rubric. It is possible to receive up to 20 marks.

	4	3	2	1
Content Quality	All abiotic and biotic components of the ecosystem are identified.	Most abiotic and biotic components of the ecosystem are identified.	Some abiotic and biotic components of the ecosystem are identified.	Few or no ecosystem components are identified.
Organization	The chart or diagram is very logical, clear, and accurate.	The chart or diagram is mostly logical, clear, and accurate.	The chart or diagram is mostly accurate.	The chart or diagram is disorganized and inaccurate.
Interconnectedness	The effects of removing one component in the ecosystem are thoroughly discussed, referring to the diagram.	The effects of removing one component in the ecosystem are discussed, referring to the diagram.	The effects of removing one component in the ecosystem are discussed.	The effects of removing one component in the ecosystem are poorly discussed.
Populations, Relationships, and Interactions	Relationships between all biotic components of the ecosystem are explained in detail.	Relationships between most biotic components of the ecosystem are explained.	Relationships between some biotic components of the ecosystem are explained.	Few or no biotic relationships of the ecosystem are explained.
Abiotic Effects	All abiotic effects on populations are accurate and explained in great detail.	Most abiotic effects on populations are explained.	Some abiotic effects on populations are explained.	Few or no abiotic effects on populations are mentioned.

Lab: Leaf Size**(1 mark) Prediction****(4 marks) Data Table**

	Location 1	Location 2
Description of Location (Abiotic Factors)		
Leaf Length Measurements (cm)		
Average Leaf Length (cm)		

Calculations and Questions

(2 marks) 1. Find the average leaf length for each location by adding the 25 leaf lengths measured for one location and dividing by 25.

(4 marks) 2. Describe how the abiotic conditions in the two locations differ.

(1 mark) 3. Was there a difference in average leaf size in the two locations?

Conclusion

(5 marks) 4. If there was a difference, hypothesize why, making reference to the abiotic conditions.

MODULE 3: LESSON 2 ASSIGNMENT

This Module 3: Lesson 2 Assignment is worth 24 marks. The value of each assignment and each question is stated in the left margin.

(24 marks) Lesson 2 Assignment: Classifying and Naming Organisms

TR 2. Arthropod Activity

(12 marks) Part A

Complete this table showing your observations from the activity about arthropods. You should have information for four different arthropods, and you need to identify the class of each arthropod.

	Body Sections (1, 2, 3, or > 3)	Walking Legs (6, 8, or > 8)	Other Appendages?	Antennae (0, 2, or 4)	Claws Yes/No	Jaws Yes/No	Class	Common Name
Specimen 1								
Specimen 2								
Specimen 3								
Specimen 4								

(2 marks) Part B

Early scientists may have grouped birds, dragonflies, and bats into a category called “flying animals.” Explain why this category would not be particularly useful to biologists.

(10 marks) Discuss

The following questions need to be addressed:

- How does the taxonomic classification system in this lesson compare to the classification system in Lesson 1 (biosphere, biome, ecosystem, community, population, species)?
- How does this taxonomic naming system compare to other classification systems that librarians or chemists use?
- What are the purposes of other taxonomy systems?

Share your thoughts in the discussion area with your classmates. Review at least two other student postings, and reconsider your posting if required. Submit your final discussion in this assignment.

MODULE 3: LESSON 3 ASSIGNMENT

This Module 3: Lesson 3 Assignment is worth 12 marks. The value of each assignment and each question is stated in the left margin.

(12 marks) **Lesson 3 Assignment: Classifying and Naming Organisms: Dichotomous Keys**

TR 2. Creating a Dichotomous Key

(8 marks) **Investigation 3.B: Creating a Dichotomous Key**

Create a dichotomous key that can be used to identify the trees found on page 91 of your textbook or for the trees that can be found in your backyard or community park. Your dichotomous key may be in electronic format (e.g., made in PowerPoint) or in text format (made in a word-processing program or on paper).

The marking rubric for this assignment is provided. You can receive a total of eight marks for your dichotomous key.

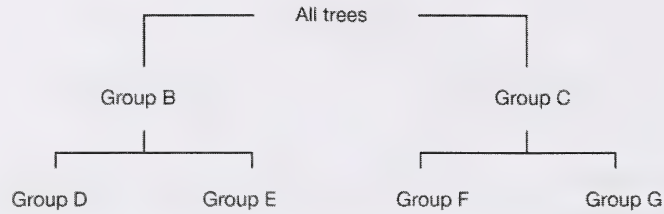
	4	3	2	1
Clarity	All steps are clear and easy to follow.	Most steps are clear and easy to follow.	Some steps are easy to follow.	Few or no steps are easy to follow.
Accuracy	The teacher and students can use the key to identify all the plant pictures correctly.	The teacher and students can use the key to identify most plants correctly.	The teacher and students can use the key to identify some plants correctly.	The teacher and students are not able to identify any plants using the key.

Procedure

Step 1: Study the 10 trees shown on page 91 of your textbook.

Step 2: If you think it will help you sort the trees into groups, make a copy of the page and cut out the pictures. If you chose not to do this, proceed directly to step 4.

Step 3: Use the blank dichotomous key shown below as a model for your dichotomous key.



Continue

- Select one characteristic that will sort all the trees into two groups—B and C. (They either have the characteristic or they don't.) Record this characteristic. Organize your cut-out pictures into the two groups.
- Looking at group B, select one characteristic that will sort the trees into two groups—D and E.
- Continue sorting all the trees into groups, and record the characteristics used. You are finished sorting when only one tree is left in each group.
- Each step of your key should offer two choices: has the characteristic, or doesn't have the characteristic.

Once you have completed your key, see if it works!

(2 marks) Analysis

Which characteristics of trees were not useful for creating your key? Explain why not.

(2 marks) Conclusion

Why does a key offer only two choices at each step?

MODULE 3: LESSON 4 ASSIGNMENT

This Module 3: Lesson 4 Assignment is worth 36 marks. The value of each assignment and each question is stated in the left margin.

(36 marks) **Lesson 4 Assignment: Studying Organisms in Ecosystems: Biomes, Habitats, and Niches**

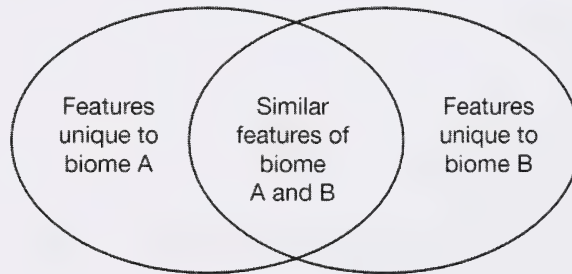
TR 1. Comparing Biomes and Niches

(8 marks) **Part A—Comparing Biomes**

Use your textbook, this lesson, and the Internet to investigate the specific features of any two biomes. Use a Venn diagram like the one shown here to compare and contrast the two biomes. (Other organizational diagram/tools may be accepted.) Place the similar features in the overlapping area of the two circles.

Include the following abiotic and biotic characteristics in your Venn diagram:

- average rainfall
- seasonal temperatures
- physical features (mountains, coasts, bodies of water)
- geographical locations (for e.g., latitudes, longitudes, by oceans)
- types of plants and animals



(8 marks) Part B—Comparing Niches

Select two species from the “Survival in the Sea” video. You will create a new Venn diagram to show the ecological niches of the two species. For parts of their niches that are similar, place the information in the area where the two circles overlap. Remember that an organism’s niche includes the following:

- the abiotic factors needed for survival (e.g., shelter, environment, temperature, salt/fresh water, pH, and rocks for camouflage)
- the biotic factors affecting its survival (e.g., predators and prey)

TR 2. Thought Lab 3.2: Forest Habitat and Bird Biodiversity

Complete this Thought Lab on page 99 of your textbook. This study compares species richness and abundance in pure and mixed stands of trees. You will attempt to answer the question: How will communities of birds vary between a forest dominated by one tree species and a forest with a variety of tree species?

The following is to be submitted for marks:

- a statement of the problem
- a hypothesis
- a graph of the data
- all Analysis questions

(1 mark) Problem

(2 marks) Hypothesis

(5 marks) Graph

Analysis Questions

(1 mark) 1.

(2 marks) 2.

(6 marks) 3.

(2 marks) 4.

(1 mark) 5.

MODULE 3: LESSON 5 ASSIGNMENT

This Module 3: Lesson 5 Assignment is worth 28 marks. The value of each assignment and each question is stated in the left margin.

(28 marks) Lesson 5 Assignment: Studying Organisms in Ecosystems: Limiting Factors

TR 1. Limiting Factors: Part A and B

(12 marks) Part A: Limiting Factors Facing Burrowing Owls

After you have read the related article, create a table, a diagram, or a flow chart to list and explain how each biotic and abiotic limiting factor affects the burrowing owl population in Alberta.

You will be marked according to the following rubric.

	4	3	2	1
Content Quality	At least ten abiotic and biotic limiting factors are identified.	From seven to nine abiotic and biotic limiting factors are identified.	From four to six abiotic and biotic limiting factors are identified.	Few or no limiting factors are identified.
Organization	The chart, diagram, or table is very logical, clear, and accurate.	The chart, diagram, or table is mostly logical, clear, and accurate.	The chart, diagram, or table is mostly accurate.	The chart, diagram, or table is disorganized and inaccurate.
Limiting Factors Effect on Burrowing Owls	The effect of every limiting factor on the burrowing owl is explained.	The effects of most limiting factors are explained.	The effects of some limiting factors are explained.	Few or no effects are explained.

Part B: Knapweed—The Super Competitor

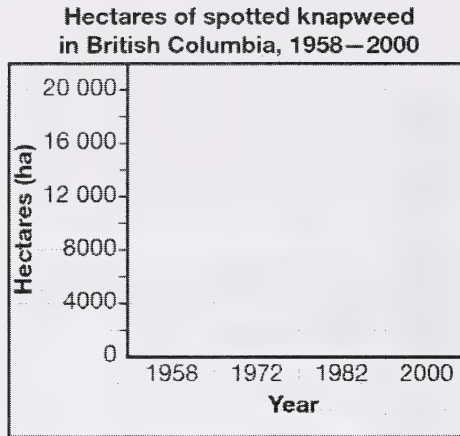
- (5 marks) 1. Investigate and write two paragraphs about the biology/ecology of spotted knapweed (*Centaurea biebersteinii*). Perform your own search to specifically answer these questions:
- How does spotted knapweed reproduce?
 - What animals eat the plant?
 - How was it introduced into North America?
 - How does spotted knapweed spread?
 - What problems does it cause in North American ecosystems?
 - Why does the plant not cause the same damage to its native ecosystem?

	5	4	3	2	1
Questions Answered	All six questions are thoroughly and accurately answered.	All six questions are answered.	Four to five questions are answered in the paragraph.	Two to three questions are answered.	One or no questions are answered.

* Parks Canada may be a good website to explore.

Graph Analysis

1. Study the graph.



Answer the following two questions:

(2 marks)

- a. Describe what has happened to the population of spotted knapweed since its arrival in British Columbia.

(4 marks)

- b. Predict the number of hectares that will be covered by spotted knapweed in 2020. Explain your prediction.

(3 marks) 3. Explain why some introduced species can become so invasive and damaging to native species and ecosystems.

(2 marks) 4. Populations of spotted knapweed are present in Alberta. How could spotted knapweed spread throughout the province?

MODULE 3: LESSON 6 ASSIGNMENT

This Module 3: Lesson 6 Assignment is worth 116 marks. The value of each assignment and each question is stated in the left margin.

(116 marks) Lesson 6 Assignment: Studying Organisms in Ecosystems: A Field Study

TR 1. Mountain Pine Beetle vs. an Ecosystem

Answer “Analysis” questions 1 to 3 from page 77 of the textbook in point form, using a chart or a diagram.

(8 marks) 1.

(2 marks) 2.

(2 marks) 3.

(4 marks) Extension

Write or present (podcast, video) a short paragraph on how the pine beetle infestation affects you as either a local elder or a logger. If you choose to create a multimedia piece, indicate where to find this file or attach it to this document.

TR 2. Planning for Your Field Study: Part I**(4 marks) Procedure: Step 5**

You have chosen a species from the ecosystem you will be studying. You will write a paragraph that explains how this species interacts with the abiotic and biotic components of its environment. For example, what are its nutrient requirements? Your information will be based on experiences, observations, and/or research.

(6 marks) Procedure: Step 6

Describe the typical population, community, and ecosystem of the species you chose in step 5. You may use drawings, charts, or a paragraph for your description.

TR 3. Planning for Your Field Study: Part II

(6 marks) Procedure: Step 2

Decide which three abiotic features of your ecosystem you will measure. Brainstorm the types of tools you will need to measure these abiotic features. How would you measure soil or air temperature? You may want to contact a field biologist at a local university or forestry department office to find out what tools they use to conduct a field study.

Analysis

(2 marks) 1. What is the difference between precision and accuracy? (Hint: Refer to Appendix A on page 748 of your text)

(3 marks) 2. How do the tools you use to gather information about an ecosystem affect the accuracy or precision of your measurements? For example, how does gathering information about soil moisture content from an Internet database or map compare with completing the measurements yourself?

(2 marks) 3. What are two advantages of each tool?

(2 marks) 4. What are two disadvantages of each tool?

- (3 marks)** 5. Is it precise enough to measure an abiotic factor at only one location in an ecosystem? Explain your answer.
- (2 marks)** 6. How will you obtain the tools you have selected? Which members of your team will be responsible for using the various tools?

Field Study

Experimental Plan

(10 marks) 1. You may use bulleted points to outline your plan. You are outlining the following to your teacher:

- the two ecosystems you are looking at
- the species you will be studying
- the three abiotic factors you will be observing
- the delegation of duties
- the tools you plan to use
- how you will carry out your study (Will you use a quadrat or a transect? Will you take pictures, sketch, or collect samples?)
- what safety precautions you will follow

7 marks for covering all points

3 extra marks awarded if you include more detail

(60 marks) Lab Report

Once you have completed the experimental plan, you will need to complete either the Investigation 3D Field Study Report or a Virtual Field Study Report. The report formats are attached to this assignment. If you have completed the outdoor field study, follow the outline titled Field Study Report Format. If you have completed the virtual field study follow the outline titled Virtual Field Study Report Format.

FIELD STUDY REPORT FORMAT

To do a field study efficiently, use the following format. Careful consideration should be given to the mark value of each area. All lab reports must be neatly presented. **Your report will be a document separate from this assignment sheet.**

This is worth **60 marks**.

GENERAL DESCRIPTION: 10 marks

The general description should paint a picture to someone not familiar to the area or weather the day of your investigation. Start observations in a specific direction (i.e. North) and state direction, distances, and quantities. It should include:

- Exact geographic location where the investigation took place: i.e. In a ditch on range road 271
- History of the area: i.e. How long it has remained undisturbed
- The type of area: small pond, open grass pasture, forested area
- Size of the area you're working in: i.e., 2 m², 2 acres, 40 acres
- Type of vegetation: i.e., trees, shrubs, grasses, weeds
- Approximate percentage of area that is covered by the vegetation
- Seasonal water conditions (if you are looking at a body of water)
- Weather conditions of the day
- Nearby environmental factors: i.e. housing, factories, farms, roads, many people.
- Nearby streams, harbors, parks, parking lots, etc.

The major objective is to have someone paint a picture of the area after your description.

METHOD: 5 marks

A brief list and description of the tools and methods used in your field study

DATA and OBSERVATIONS: 20 marks

This is the information you need to record on your data sheets.

- Abiotic components of your study area (qualitative and quantitative)
- Biotic components of your study area including plant and animal species (common and scientific names)

Data should be accurately and neatly recorded, however you should not rewrite the data in paragraph form. **ONLY INCLUDE YOUR COMPLETED DATA SHEETS.** A graph comparing your two study areas must be included. You must decide what factors you will compare and how to format your graph. The graph must be properly scaled and labeled. A map of the area must be included. The map must show:

- study areas
- north directional
- surrounding factors such as major buildings or fences, landmarks
- approximate distances

- a map to scale (the map is worth 5 marks of Data and Observations) See below for an example of a map.

ANALYSIS: 15 marks

Provide responses to the following questions.

1. Why was it important to choose sample areas randomly? (1 mark)
2. Why was it important to sample more than one area in your field study? (2 marks)
3. What are some limiting factors that might affect species in your study site? (2 marks)
4. a) Write a description comparing the diversity and abundance of species in the two study sites. (2 marks)

b) Describe how the ecosystems of the two study sites are similar. (2 marks)

c) Describe how they are different. (2 marks)
5. How have humans changed either of the ecosystems of the sites you studied? (2 marks)
6. Describe the tools and materials you or your team chose in terms of usefulness, accuracy, and reliability. (2 marks)

ERRORS: 5 marks

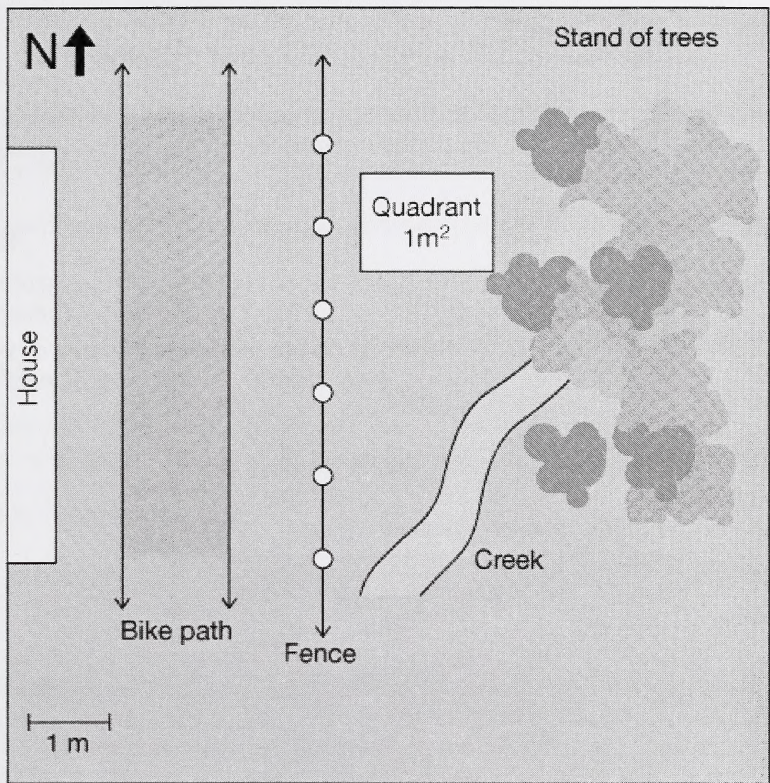
Everyone makes errors. With careful thought you should be able to identify a minimum of two possible errors in your study. It is important to understand that many “errors” lead to scientific discoveries! If you made errors while doing the investigation, this is your chance to redeem yourself. You must state what the error was, and what affect it had on your ability to complete the investigation.

For example, suppose one day you forgot to take all of your tools with you to the pond you were studying. At the site, a chemical was missing and an oxygen test could not be performed. The same day no tadpoles were caught. You must state that you forgot to check the equipment, leaving behind the chemical solution. Without the solution you could not do the oxygen test, and therefore “could not conclude whether the absence of tadpoles was due to a lack of oxygen, food, or light.” Also state ways in which you could improve your investigation techniques in future field studies.

CONCLUSION: 5 marks

This should indicate your feelings on the well-being of the area you’ve been working in. Is it healthy, or not? WHY? What do you feel the future is for the area? Is it improving, or getting worse? Base your conclusions on observations only. Don’t make statements that your observations do not support.

SAMPLE MAP



VIRTUAL FIELD STUDY REPORT FORMAT

To do a field report efficiently, use the following format. Careful consideration should be given to the mark value of each area. All lab reports must be neatly presented. **Your report will be a document separate from this assignment sheet.**

This is worth **60 marks**.

GENERAL DESCRIPTION: 5 marks

The general description should paint a picture to someone not familiar to the area or weather the day of your investigation. Since this is a virtual field study, your general description will be based on your observations from the photographs within the field study. It should include:

- The type of area: small pond, open grass pasture, forested area
- Size of the area you're working in: i.e., 2 m², 2 acres, 40 acres
- Type of vegetation: i.e., trees, shrubs, grasses, weeds
- Approximate percentage of area that is covered by the vegetation
- Seasonal water conditions (if you are looking at a body of water)
- Weather conditions of the day

The major objective is to have someone paint a picture of the area after your description. In the case of the virtual lab, however, the description will be more general.

METHOD: 5 marks

Create a brief list and description of the tools and methods used in the virtual field study. This will be dependent on your observations of photographs in the field study

DATA and OBSERVATIONS: 25 marks

You will include Tables 1-6 in this section of your report. These Tables are worth 20 marks (0.5 marks/response)

A graph comparing the two study areas must also be included. You must decide what factors you will compare and how to format your graph. The graph must be properly scaled and labeled. This is worth 5 marks.

ANALYSIS: 15 marks

Provide responses to the following questions.

1. Why is it important to choose sample areas randomly? (1 mark)
2. Why is it important to sample more than one area in a field study? (2 marks)
3. What are some limiting factors that might affect species in the virtual field study? (2 marks)

4. a) Write a description comparing the diversity and abundance of species in the two study sites. (2 marks)
b) Describe how the ecosystems of the two study sites are similar. (2 marks)
c) Describe how they are different. (2 marks)
5. What future impacts could humans have on the ecosystems in this virtual field study? (2 marks)
6. Describe the tools and materials used in the virtual field study in terms of usefulness, accuracy, and reliability. (2 marks)

ERRORS: 5 marks

Everyone makes errors. With careful thought, you should be able to identify a minimum of two possible errors the two students in the virtual field study could make. It is important to understand that many "errors" lead to scientific discoveries! State what you think an error could be and the possible effect it had on the outcome of the investigation.

The following example is not based on a virtual field study, however the example should give you an idea of how to look at the consequences of an error.

Example: Suppose one day you forgot to take all of your tools with you to the pond you were studying. At the site a chemical was missing and an oxygen test could not be performed. The same day no tadpoles were caught. You must state that you forgot to check the equipment, leaving behind the chemical solution. Without the solution you could not do the oxygen test, and therefore "could not conclude whether the absence of tadpoles was due to a lack of oxygen, food, or light."

CONCLUSION: 5 marks

This should indicate your feelings on the well-being of the area shown to you in the virtual field study. Is it healthy, or not? WHY? What do you feel the future is for the area? Base your conclusions on observations only. Don't make statements that your observations do not support.

**Once you have completed all of the questions and the lab report,
submit your work to your teacher.**

